

1) Let the events **H**, **C**, **S** denote "Hot tap is open", "Cold tap is open" and "Sink is closed", concerning the bath tube. Write the events below with **H**, **C**, **S** and  $\cdot$ ,  $+$ ,  $\sim$  ( $\cap$ ,  $\cup$ , complement):

**A** = "the tube is full,                      **B** = " the water is comfortable".

Explain the meaning of the event: **D** =  $\sim H \cdot \sim C \cdot S$

10 pt

2) Three hunters, named **A**, **B**, **C** hunt a wild pig. **A** hits it with 80%, **B** with 70% and **C** with 75% independently. How much chance the **Pig** has to escape?

8 pt

3) Suppose, that the probability of giving birth of a boy is 0,52, of a girl is 0,48. Investigating families having two children, which case has the greater probability: having two children of the same sex (two boys or two girls), or of different sex (one boy and one girl)?

10 pt

4) There are 3 kinds of chocolates in a box: 25 dark, 30 white and 10 milk, 65 total. Peter stole 4 of them. What are the probabilities of that

a) Peter did not steal dark?    b) Peter stole at least two kinds?

10 pt

5) Draw five cards *without* repetition from the Hungarian deck. What is the probability that:

a) only red cards,    b) no red cards,    c) exactly two red cards were drawn?

10 pt

6) Romeo and Juliet are to meet in the library between 3 pm and 5pm. They are sure to come but they both are busy, so they can not tell their exact arrival time in advance, and they arrive independently. Both of them can wait at most fifteen minutes and leave after. What is the probability of a succesful date (meeting)?

10 pt

7) Little red riding hood has three ways of going to grandma's to take cookies for her: forest, bicycle and highway, she chooses them with probabilities 15%, 50% and 35% . There's a big bad wolf and the percentage of the wolf attacking her if she takes the forest is 80% , on bicycle 10% and on highway 5%.

a) What is the probability that the wolf says "Hmmm, she was fine!".

b) Arriving she told grandma "I rode the bicycle". What probability grandma can believe her?

12 pt

8) Aristid is a little drunk, he went home late at night and met the door locked. He tries to open again and again until the first success. Assume that his trials are independent, and each has success 0.2 . Calculate the *distribution* of this discrete random variable which counts ("measures") the number of trials necessary to open the door.

10 pt

9) **Definition:** Give the everyday meaning of *distributions function* and its mathematical definition, with the (four) axioms (Theorem) .

10 pt

10) **Theorem:** Give Bayes' Reciprocity Theorem (explain the meanings of the letters in it). 10 pt

**Total: 100 pts**

*Hints:*

